Constructed Response Type Statements

$y = \boldsymbol{m}x + \boldsymbol{b}$ *Slope – Intercept Form*

Since the equation of the line is in slope-intercept form I know <u>five pieces of information</u>

1. **y-intercept**, $(0, b)$ or $(0, y)$ which is the location where the line passes the y-axis
2. the **slope** of the line ***m***, $m = \frac{Rise}{Run}$
3. the ***rise***
4. the ***run***, and I know
5. if the <u>*slope is positive or negative.*</u>

With this information I can find

1. any number of coordinates from the y-intercept (plot or create a table).
2. the x-intercept, $(x, 0)$ which is where the lines passes the x-axis.

I can <u>transform the slope-intercept form</u> $y = \boldsymbol{m}x + \boldsymbol{b}$ <u>into the standard form</u> $\boldsymbol{A}x + \boldsymbol{B}y = \boldsymbol{C}$ and I can transform the standard form ino the slope-intercept using **properties of equality**.

$\boldsymbol{A}x + \boldsymbol{B}y = \boldsymbol{C}$ to $y = \boldsymbol{m}x + \boldsymbol{b}$	$y = \boldsymbol{m}x + \boldsymbol{b}$ to $\boldsymbol{A}x + \boldsymbol{B}y = \boldsymbol{C}$
$\mathbf{3}x - \mathbf{4}y = \mathbf{12}$ $\underline{-3x \qquad -3x}$ $-4y = -3x + 12$ $\frac{-4}{-4}y = \frac{-3x+12}{-4}$ $y = \frac{\mathbf{-3}}{\mathbf{-4}}x + \frac{\mathbf{12}}{\mathbf{-4}}$ $y = \frac{\mathbf{3}}{\mathbf{4}}x - \mathbf{3}$ where $\boldsymbol{m} = \frac{3}{4}$ $\boldsymbol{b} = \frac{12}{-4} = -3$	$y = \frac{\mathbf{3}}{\mathbf{4}}x - \mathbf{3}$ $\underline{-\frac{3}{4}x \qquad -\frac{3}{4}x}$ $-\frac{3}{4}x + y = -3$ we could leave it here or modify it to eliminate the fractional coefficient as $(-4)\cdot(-\frac{3}{4}x + y) = -3\cdot(-4)$ multiplied by the <u>**L**</u>owest <u>**C**</u>ommon <u>**D**</u>enominator $\mathbf{3}x - \mathbf{4}y = \mathbf{12}$

We can see the above algebraically.

$\boldsymbol{A}x+\boldsymbol{B}y=\boldsymbol{C}$	$y=\boldsymbol{m}x+\boldsymbol{b}$
$\underline{-Ax \quad -Ax}$ $By=-Ax+C$ $\frac{By}{B}=\frac{-Ax+C}{B}$ $y=\frac{\boldsymbol{-A}}{\boldsymbol{B}}x+\frac{\boldsymbol{C}}{\boldsymbol{B}}$ $y=\ \boldsymbol{m}x+\boldsymbol{b}$ where $\boldsymbol{m}=\frac{-A}{B}$ $\quad \boldsymbol{b}=\frac{C}{B}$	$\underline{\boldsymbol{-m}x \quad \boldsymbol{-m}x}$ $-\boldsymbol{m}x+y=\boldsymbol{b}$ *If any term is a fraction, multiply all terms by lowest common multiple of denominators to eliminate the fractions.

Transforming from standard form to slope-intercept form is more challenging.

Constructed Response Type Statements II

$\boldsymbol{A}x+\boldsymbol{B}y=\boldsymbol{C}$ ***Standard Form***

- Since the equation of the line is in standard form I can easily find the x-intercept $(x,0)$ and y-intercept $(0,y)$.

The **y-intercept** is the point [or coordinate] $(\mathbf{0},\boldsymbol{y})$ or $(\mathbf{0},\boldsymbol{b})$ where a line crosses the y-axis. At this point the x-coordinate is zero and the y-coordinate is b and the unknown value.

The **x-intercept** is the point [or coordinate] $(\boldsymbol{x},\mathbf{0})$ where a line crosses the x-axis. At this point the y-coordinate is zero and the x-coordinate is the unknown value.

$(\mathbf{0},\boldsymbol{y})$	$6x+4y=36$	$(\boldsymbol{x},\mathbf{0})$
$6x+4y=36$ $6\cdot0+\mathbf{4y=36}$ $\mathbf{4y=36}$ $\frac{4y}{4}=\frac{36}{4}$ $y=9$ therefore $(0,9)$ y-intercept	substitute points into equation	$6x+4y=36$ $\mathbf{6x}+4\cdot0=\mathbf{36}$ $\mathbf{6x=36}$ $\frac{6x}{6}=\frac{36}{6}$ $x=6$ therefore $(6,0)$ x-intercept

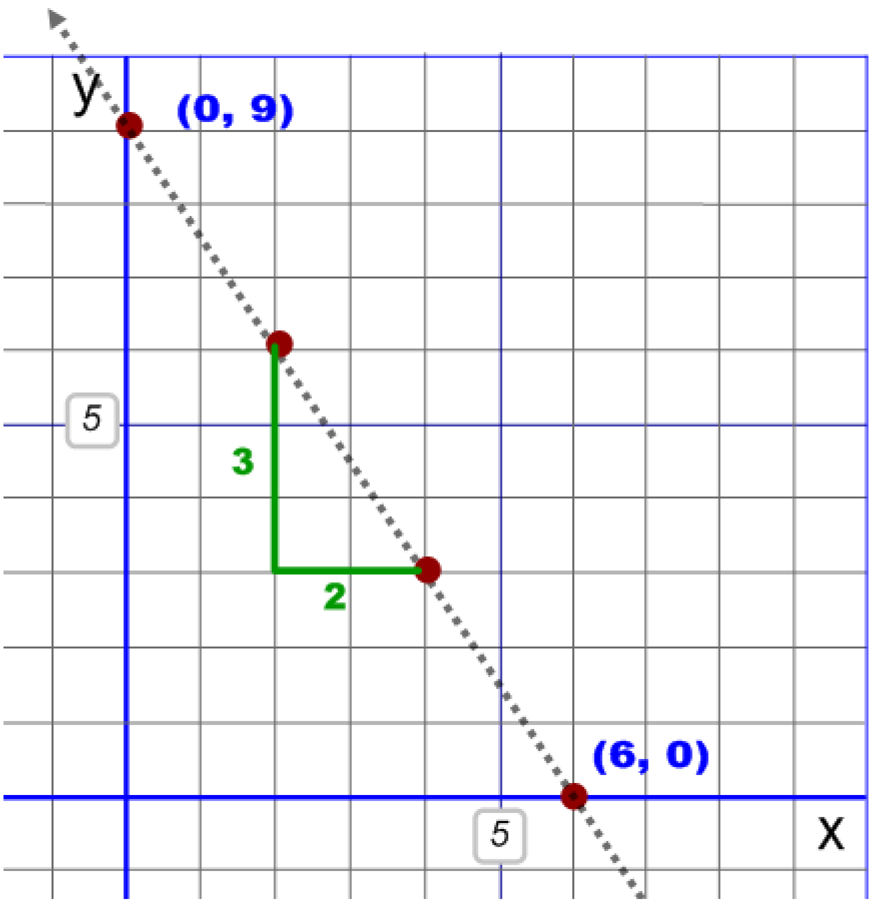
- Point 1 $(\boldsymbol{x}_{1},\boldsymbol{y}_{1})$ is $(0,9)$.
- Point 2 $(\boldsymbol{x}_{2},\boldsymbol{y}_{2})$ is $(6,0)$.

- I can find the slope $m=\frac{y_2-y_1}{x_2-x_1}$ using these two points $(0,12)$ and $(6,0)$.

$$m=\frac{0-9}{6-0}=\frac{-9}{6}=\mathbf{\frac{-3}{2}} \qquad m=\frac{\textbf{\textit{Rise}}}{\textbf{\textit{Run}}} \qquad m=\frac{-3}{2}$$

* Notice the $\frac{\textbf{\textit{Rise}}}{\textbf{\textit{Run}}}=\mathbf{\frac{-3}{2}}$ that is, for every 2 steps to the right we go down by 3.

- Plot on the coordinate grid
- Create a table of the domain and range.



Table

x	y
0	9
2	6
4	3
6	0
domain	*range*

Constructed Response Type Statements III

I can create parallel and perpendicular lines by knowing the slope of the line.

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Constructed Response Type Statements III

I can create parallel and perpendicular lines by knowing the slope of the line.

Parallel Lines $\parallel$ have the same slope and a different y-intercept.

$$\overline{AB} \parallel \overline{CD} \qquad m_{AB} = m_{CD}$$

$$\boldsymbol{y = m_{AB}x + b_{AB}} \qquad \parallel \qquad \boldsymbol{y = m_{CD}x + b_{CD}}$$

Perpendicular Lines $\perp$ $\quad \overline{AB} \perp \overline{EF} \quad m_{EF} = -\frac{1}{m_{AB}}$ or $m_{AB} = -\frac{1}{m_{EF}}$

$$\boldsymbol{y = m_{AB}x + b_{AB}} \qquad \perp \qquad \boldsymbol{y = m_{EF}x + b_{EF}}$$

A Perpendicular Line is rotated 90 degrees from the original line.

Parallel Lines have same slope.	**Perpendicular Lines**
$\overline{AB} \quad \boldsymbol{y = -\frac{9}{7}x + 1} \quad m_{AB} = -\frac{9}{7}$	$\overline{AB} \quad \boldsymbol{y = -\frac{9}{7}x + 1} \quad m_{AB} = -\frac{9}{7}$
$\overline{AB} \parallel \overline{CD}$ at $(\mathbf{0, -4})$	$\overline{AB} \perp \overline{EF}$ at $(\mathbf{0, 1})$
$\overline{CD} \quad \boldsymbol{y = -\frac{9}{7}x - 4} \quad m_{CD} = -\frac{9}{7}$	$\overline{EF} \quad \boldsymbol{y = \frac{7}{9}x + 1} \quad m_{EF} = +\frac{7}{9}$